Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51

COMMENTS OF THE WIRELESS COMMUNICATIONS ASSOCIATION INTERNATIONAL, INC.

Susan Polyakova
Wireless Communications Association International (WCAI)
1333 H Street
Suite 700 West
Washington, DC 20005
(202) 452-7823

June 8, 2009

wcainternational
WIRELESS COMMUNICATIONS ASSOCIATION

TABLE OF CONTENTS

Before the

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51

COMMENTS OF
THE WIRELESS COMMUNICATIONS ASSOCIATION INTERNATIONAL, INC.

The Wireless Communications Association International ("WCAI"), the trade association of the wireless broadband industry, submits these comments on the Notice of Inquiry released by the Federal Communications Commission ("FCC") in this proceeding on April 8, 2009.[1]

I. EXECUTIVE SUMMARY

Universal next-generation mobile wireless broadband network deployment and adoption must be the cornerstone of America's broadband plan. The majority of consumers value mobility more highly than broadband access at home and consider the mobile phone the technology device that would be hardest to do without. In addition to being more highly valued than static broadband access, mobile wireless broadband networks maximize both capability and affordability to sparsely-populated rural areas and to low income consumers in urban centers. Mobile wireless broadband networks offer excellent throughput and mobility, and are approximately 20 times less expensive to deploy in rural areas than fiber networks. Mobile broadband also increases the frequency of online use and the overall value of

[1] *A National Broadband Plan for Our Future*, FCC 09-31 (rel. Apr. 8, 2009) ("NOI").

broadband to society. Perhaps most important, however, is that mobile wireless broadband is a prerequisite to the coming paradigm shift in computing and communications – ubiquitous computing – and the key to reestablishing American leadership in information technology.

To realize the tremendous benefits of universal deployment and adoption of next-generation mobile wireless broadband, WCAI recommends that America's broadband plan:

- Recognize there is no single, homogenous broadband product market and that broadband definitions focused on "speed" do not accurately reflect consumer preferences;
- Promote and advance the competitive market forces that already are driving broadband deployment by minimizing barriers to deployment and promoting investment, by
    - Eliminating obstacles to tower siting, pole attachments, and rights-of-way; and
    - Assuring availability of adequate spectrum resources to meet growing demand for wireless broadband services;
- Comprehensively reform universal service policies with a broadband paradigm as the lodestar; and
- Promote competition in the backhaul and middle mile markets.

II. ESTABLISHING GOALS AND BENCHMARKS

Establishing goals is the most important aspect of planning. Policymakers must decide *what* they wish to accomplish before they attempt to decide *how* to do it.

Given this unprecedented opportunity to plan for the digital future, when considering goals, policymakers should decide what broadband should look like five years or a decade from now rather than what broadband looked like yesterday. Yesterday is past and what exists today informs but does not determine what should be built tomorrow (as opposed to where it should be built).[2] If policymakers are going to plan for our *future*, they need to think like *futurists*.

Unfortunately, the goals proposed so far by commenters in this proceeding (and in others relating to broadband) too often look to the past rather than the future. The focus of the comments has been on delivering access to consumers sitting in a chair at home in front of a personal computer screen. The primary emphasis of these comments is improving broadband "speeds"[3] within this existing paradigm. But the rest of the world is leapfrogging the limitations of the personal computer era and moving directly to a mobile broadband environment.[4] Planning for an "improved" version of the existing broadband paradigm when the rest of the world is planning for the future will doom America's broadband plan to failure.[5]

The *future* is ubiquitous, "everyware"[6] access to broadband.[7] "In everyware,

---

[2] Mapping is necessary to determine where broadband infrastructure should be built.

[3] By "speed," these commenters refer to throughput.

[4] Emerging markets already "have in many cases leapfrogged the PC era and are routinely using their mobile devices for a variety of consumer services." *IBM Study Finds Consumers Prefer a Mobile Device Over the PC*, press release (rel. Oct. 22, 2008) (available at http://www-03.ibm.com/press/us/en/pressrelease/25737.wss#feeds).

[5] "The mobile device will be the primary connection tool to the Internet for most people in the world in 2020." Janna Quitney Anderson, *The Future of the Internet III*, Pew Internet and American Life Project, at 2 (Dec. 14, 2008) (available at http://www.pewinternet.org/Reports/2008/The-Future-of-the-Internet-III.aspx).

[6] *See* Adam Greenfield, *Everyware: The Dawning Age of Ubiquitous Computing* (2006) (coining the term "everyware" in reference to ubiquitous or pervasive computing).

all of the information we now look to our phones or Web browsers to provide becomes accessible from just about anywhere, at any time, and is delivered in a manner appropriate to our location and context."[8] This is the coming shift in paradigm for which America should be preparing itself – "an exodus from the PC as a stand-alone platform and a remaking of everyday life around the possibilities of [everyware] information processing."[9] This ultimate goal presupposes ubiquitous mobile wireless broadband access that is capable of auto-discovery wherever a consumer goes.[10] Put more simply, mobile wireless broadband is a prerequisite to evolving America's broadband paradigm to ubiquitous computing and reestablishing American leadership in information technology.

A. Universal next-generation mobile wireless broadband network deployment and adoption must be the cornerstone of America's broadband plan.

America cannot settle for merely building a faster and more universally deployed version of the largely static broadband infrastructure that predominates today. We must move well beyond that limited vision merely to keep up with nations like South Korea, who are already building "ubiquitous cities" based on wireless platforms.[11] Mobile broadband users are driving technological change: "with the emergence of mobility, having broadband at home is no longer inevitably

---

[7] Ubiquitous computing is also known as pervasive computing, ambient intelligence, or more recently, everyware. See http://en.wikipedia.org/wiki/Ubiquitous_computing.

[8] Greenfield, *Everyware*, *supra* note 6, at 1.

[9] *Id*. at 35.

[10] *Id*. at 204.

[11] See http://en.wikipedia.org/wiki/Ubiquitous_city.

associated with elite status for a tech user."[12] Instead, "mobile connectivity is the new centerpiece of high-tech life,"[13] and American consumers that lack mobile broadband access are being left behind. To become the most connected nation in the world, and to reap the tremendous economic benefits that entails, America must make ubiquitous next-generation mobile wireless broadband network deployment and adoption the cornerstone of America's broadband plan.

a. Consumers value mobility more highly than access at home.

Mobile wireless broadband should be the cornerstone of America's broadband policy for many reasons, but the reason that requires the least explanation is elementary: the majority of consumers value mobility more highly than access at home. PEW research indicates that the majority of consumers now consider the mobile phone the technology device that would be "hardest to do without."[14] This conclusion is not limited to mobile "phones." According to an IBM study released last fall, over 50 percent of consumers would substitute their Internet usage on a PC for a mobile device.[15] These independent sources both confirm that the majority of consumers now prefer mobile connectivity to being a "PC couch potato."

---

[12] John B. Horrigan, *The Mobile Difference*, Pew Internet and American Life Project, at 98 (Mar. 25, 2009) (available at http://www.pewinternet.org/Reports/2009/5-The-Mobile-Difference--Typology.aspx).

[13] *Id*. at 16.

[14] "The cell phone went from the device that was the fourth 'hardest to do without' in 2002 to the number one slot in 2007." *Id*. at 97.

[15] *IBM Study Finds Consumers Prefer a Mobile Device over the PC*, press release (rel. Oct. 22, 2008) (available at http://www-03.ibm.com/press/us/en/pressrelease/25737.wss#feeds).

Consumers are not only voting for mobility in the polls, they are voting for mobility with their wallets. The latest CMRS Competition Report indicates that in 2008 approximately 18% of U.S. households were *mobile only*.[16] This compares to only 14% of the total population (including children) that did not have a mobile device at year-end 2007.[17] The recent report from the Center for Disease Control found that by the end of 2008 over 20% of the nation's households had "cut the cord," representing "the largest 6-month increase observed since NHIS began collecting data on wireless-only households in 2003."[18] Those that rely solely on mobile access now outnumber those who do not have mobile access at all – a trend that is continuing to accelerate.

As shown in Figure 1 below, in the United States, wireless broadband is both relatively and absolutely the fastest growing segment of broadband in the U.S.[19] The growth of broadband wireless smart phones almost doubled from 12% of handset sales at the end of 2007, to 23% of all U.S. handset sales at the end of 2008, led by AT&T's iPhone,[20] and "[m]obile Internet penetration is higher in the United

---

[16] *Thirteenth Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, DA 09-54 at para. 230 (rel. Jan. 16, 2009) ("13th CMRS Competition Report").

[17] *Id*. at pp. 6-7.

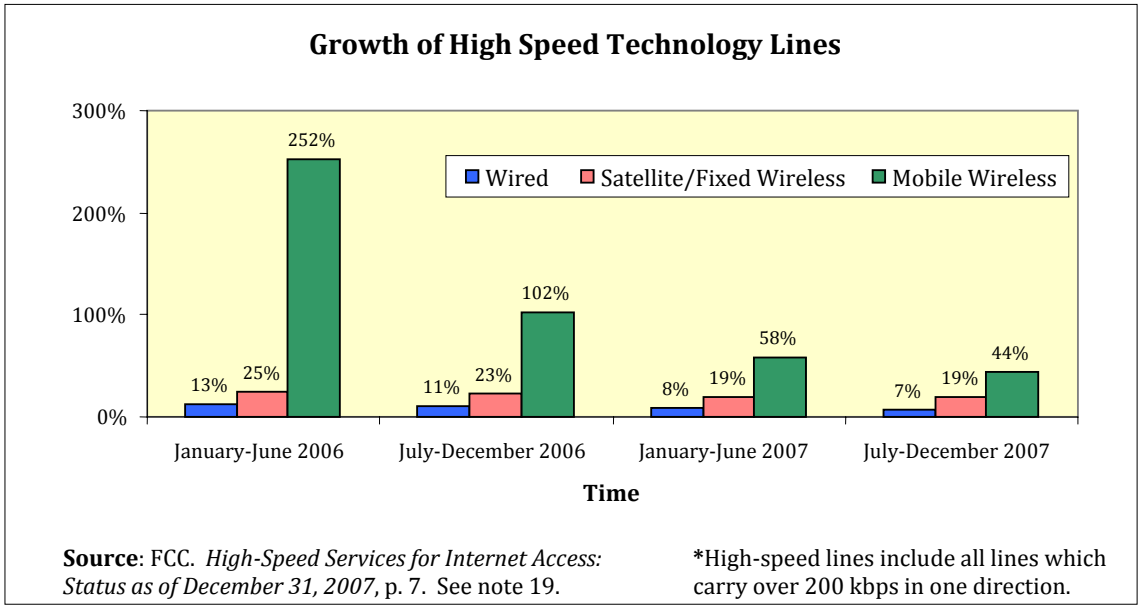
[18] *See* Blumberg & Luke, Div. of Health Interview Statictics, Nat'l Ctr. for Health Statustics, CDC, *Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, July-December 2008*, at 1 (May 6, 2009).

[19] *See High-Speed Services for Internet Access: Status as of December 31, 2007*, Industry Analysis and Technology Division, Wireline Competition Bureau (Jan. 2009). (available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-287962A1.pdf).

[20] *The NPD Group: Despite Recession, U.S. Smartphone Market is Growing*, Press Release (rel. Mar. 3, 2009) (available at http://www.npd.com/press/releases/press_090303.html).

States (15.6 percent of wireless subscribers) than in Western European countries."[21]

Figure 1



Source: FCC. *High-Speed Services for Internet Access: Status as of December 31, 2007*, p. 7. See note 19.

*High-speed lines include all lines which carry over 200 kbps in one direction.

Although it is not surprising that consumers prefer mobility when they can achieve it, it may be surprising that they prefer it even now, before next-generation mobile wireless broadband networks have been widely deployed. The consumer preferences discussed above are based primarily on the 2G and 3G networks that are more widely available today. With the capabilities provided by next-generation 4G wireless broadband networks, the consumer preference for mobility will only increase.

[21] 13th CMRS Competition Report, *supra* note 16, at p. 10.

b. Mobile wireless broadband networks maximize capability and affordability.

Mobile wireless broadband networks maximize both capability and affordability to sparsely-populated rural areas and to low income consumers in urban centers.

First, in regard to "speed," mobile wireless broadband is capable of meeting the needs of the vast majority of users.[22] Next-generation mobile wireless broadband networks already offer throughput similar to that available on DSL and DOCSIS 1.0 networks. AT&T recently announced that beginning later this year it will be upgrading its 3G network to High Speed Packet Access (HSPA) 7.2 technology, which offers theoretical peak "speeds" of 7.2 Mbps.[23] The ability of next-generation wireless networks to provide such capability is not, however, merely theoretical. Clearwire recently conducted a 30-minute drive test of its operating WiMAX network in Portland, Oregon, and measured a mean downlink rate of more than 6 Mbps and mean latency less than 100 milliseconds. While this throughput is impressive, mobile broadband throughput will continue to increase as technology advances. In the near future, WiMAX and LTE networks are expected to offer theoretical peak "speeds" of over 100 Mbps.[24]

Even more important than "speed" is mobility, a uniquely wireless capability. In the Clearwire drive test discussed above, the vehicle averaged 35 mph and hit a

---

[22] Comments of the Consumer Federation of American and Consumers Union, Report on Rural Broadband Strategy, GN Docket No. 09-29 (FCC), at 4 (filed Mar. 25, 2009).

[23] See *AT&T to Deliver 3G Mobile Broadband Speed Boost*, Press Release (rel. May 27, 2009) (available at http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26835).

[24] See http://en.wikipedia.org/wiki/WiMAX.

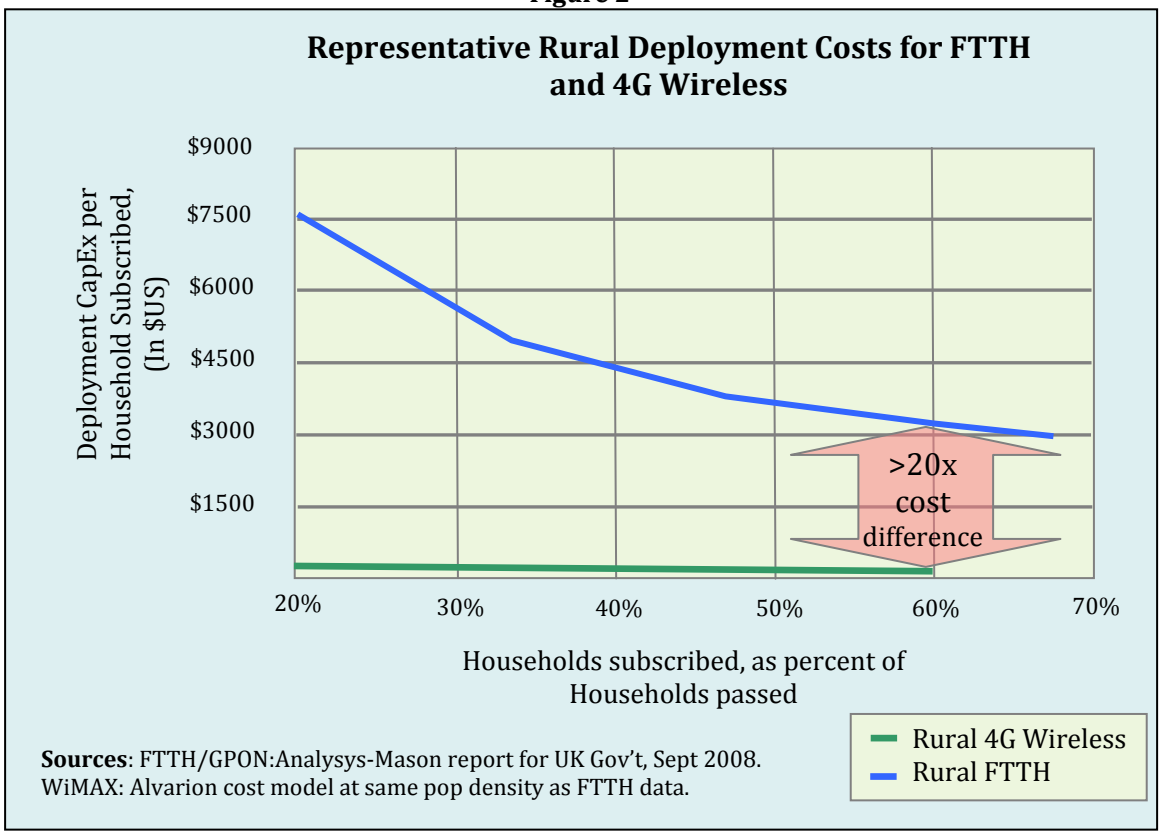
maximum speed of 55 mph while achieving impressive broadband throughput. The ability to access the Internet at 6 Mbps while driving 35 mph is why "[m]obile access to the internet constitutes an inflection point in technology adoption."[25] With such capability consumers are finally be able to access all of the features and capabilities of the Internet anywhere – in the bus, on the train, or sitting in the park during lunch – and give "always on" a whole new meaning.

Given these superior capabilities, one would expect mobile wireless broadband to be more expensive than less capable alternatives. Fortunately, the opposite is true. Wireless broadband networks can typically be built more quickly than wired networks and at significantly lower cost. Figure 2 below compares rural FTTH (GPON) to 4G wireless deployment (WiMAX) versus take-rate.[26]

[25] Horrigan, *The Mobile Difference*, *supra* note 12, at 97.

[26] The FTTH data is derived from an Analysys-Mason report commissioned by the UK. *See* Analysis Mason, *The costs of deploying fibre-based next-generation broadband infrastructure*, at 4 (rel. Sep. 8, 2008) (available at http://www.broadbanduk.org/content/view/303/7/). (Note that the original pricing data is in GBP, and the exchange rate used in the conversion was 1000 GBP=1464 $US.) The 4G curve is derived from a 4G cost model developed by Alvarion Ltd., which has been adjusted for the same population density (approx 300 households per square mile) as the FTTH curve.

Figure 2



This graph demonstrates that, even assuming an ambitious 60% take rate, the cost of FTTH deployment in rural areas would be approximately *20 times* the cost of 4G deployment.

In addition to the difference in cost between fiber and wireless, this graph demonstrates that the fixed costs of deploying new infrastructure far outweigh the variable costs, which "means that the cost per home connected is highly dependent on the level of take-up."[27] Because, as noted above, consumers have expressed a preference for mobile Internet access, this factor should be especially relevant to policymakers as they consider broadband deployment in rural areas. With the continuing trend toward wireless substitution, it seems likely that take rates for

[27] Analysis Mason, *id*. at 4.

mobile wireless broadband would exceed take rates for FTTH in rural areas, which would further exacerbate their cost differential. Given the high cost of fiber at relatively modest take rates, and the growing availability of wireless broadband networks, policymakers should not adopt a "build it and they will come" philosophy for FTTH deployment in rural areas.

This is especially relevant given that consumers will ultimately bear the cost of such deployment, either through higher prices or consumer-funded subsidy mechanisms. Due to their significantly lower cost, mobile wireless broadband networks are not only more capable than wired networks, they are also more affordable for consumers and more sustainable than wired networks, especially in rural and low income regions where initial broadband take rates may be lower than in urban areas.

c. Mobile broadband increases the frequency of online use and the value of broadband to society.

Similar to the way in which the answering machine spurred growth in voice traffic in the 1980s, "mobile internet access is drawing people into more frequent online use."[28] The frequency of mobile Internet users' online use has grown as their reliance on mobile devices has increased.[29] This growth in Internet usage is "linked not only to increasing broadband adoption, but to *positive and improving* attitudes about how mobile access makes them more available to others."[30] In contrast, those who are "reliant on stationary media tools show no growth (or declines) in the

[28] Horrigan, *The Mobile Difference*, *supra* note 12, at 18.

[29] *Id*. at 3.

[30] *Id*. (emphasis in original).

frequency of online use even though more of them have broadband access."[31] Wireless broadband access thus creates a "virtuous cycle" in which mobile access deepens and accelerates digital engagement – a cycle that is absent when consumers access the Internet only through a wired connection.[32]

This virtuous cycle enhances the value of broadband for everyone. The supply of and demand for online content increases as the online population supplements their home high-speed wired connections with mobile access.[33] "Institutions – whether governments or news organizations – have greater incentives to optimize their services to be consumed online. More people have greater opportunity to share their advice, creativity, and observations online."[34] In this way, mobile wireless broadband increases the value of the Internet for society as a whole. To maximize this virtuous cycle, it should be national broadband policy to make mobile wireless broadband available ubiquitously.

d. Mobile wireless broadband is a prerequisite to ubiquitous computing ("everyware").

Making mobile wireless broadband the cornerstone of America's broadband plan is critical for another reason: Mobile wireless broadband is a prerequisite to evolving the broadband paradigm from static Internet access to a world in which information processing is embedded in the objects and surfaces of everyday life.[35] This statement may seem too futuristic, but ubiquitous computing already exists in

---

[31] Horrigan, *The Mobile Difference*, *supra* note 12, at 4.

[32] *See id*. at 16.

[33] *Id*. at 99.

[34] *Id*. at 99.

[35] Greenfield, *Everyware*, *supra* note 6, at 18.

preliminary forms and its continued development is "effectively inevitable."[36] The question for U.S. policymakers is whether America will be a leader or a follower in the coming paradigm shift.

As the PEW Internet Life Project recently recognized, many mobile device users are already entering a new era "where 'continual information exchange' is the norm."[37] The ubiquitous computing paradigm takes this essentially human interaction to the next level, in which computing can be engaged unconsciously, without direct human input.[38] In a ubiquitous computing environment, information systems are linked and virtually every*thing* is linked to an information system through wireless (and wired) platforms. Computing becomes so distributed throughout the environment that "computers" effectively disappear.[39]

Such ubiquitous computing is already happening in South Korea, which is planning to build approximately 15 "ubiquitous cities."[40] The New Songdo city currently under construction is being built as a testbed for ubiquitous computing technologies and will offer an opportunity to study the large-scale use of radio-frequency identification, smart cards, and sensor-based devices.[41] "Imagine public recycling bins that use radio-frequency identification technology to credit recyclers

---

[36] *Id*. at 91.

[37] Horrigan, *The Mobile Difference*, *supra* note 12, at 97.

[38] Greenfield, *Everyware*, *supra* note 6, at 66.

[39] *Id*. at 1.

[40] See http://en.wikipedia.org/wiki/Ubiquitous_city.

[41] Pamela Licalzi O'Connell, *Korea's High-Tech Utopia, Where Everything Is Observed*, New York Times (Oct. 5, 2005) (available at http://www.nytimes.com/2005/10/05/technology/techspecial/05oconnell.html?ex=1286164800&en=4a368c49e8f30bd2&ei=5088).

every time they toss in a bottle" or using the same key to ride the subway, pay a parking meter, and see a movie.[42] That is the promise of ubiquitous computing, a promise that requires ubiquitous wireless broadband connectivity.

Unfortunately, while there have been extraordinary levels of private investment in wireless broadband networks in the United States, the United States nevertheless lags in this next wave of computing and communications. There are no plans for "ubiquitous cities" here. Indeed, "everyware" capabilities are largely unrepresented in the broadband policy debate. This must change if America is to be at the forefront of the mobile broadband revolution. The unique role of wireless mobility in the coming paradigm shift in computing should be recognized in America's broadband plan; ensuring that every American has access to next-generation 4G mobile wireless broadband networks must become America's highest priority.

III. DEFINITIONS

A. Broadband services are comprised of different product and geographic markets that cannot be defined by a single metric.

The NOI appears to assume that all broadband-enabled communications services now participate in a single, homogenous "broadband" product market.[43] This assumption was reasonable a decade ago when anything other than dial-up Internet service was considered "broadband" and new technologies like mobile wireless broadband were in their infancy. But the plethora of new technologies and applications available today can no longer be categorized as part of so homogenous

[42] *Id*.

[43] *See, e.g.*, NOI at paras. 9, 13, 52-53.

a "broadband" product market. For example, machine-to-machine communications, mobile wireless broadband Internet access, and satellite broadband are *not* substitutable uses – they are subject to different throughput, latency, and coverage requirements, and they target completely different market segments.

Given the degree of variation in consumer preference and broadband market segments, and the different technical and regulatory characteristics of the services that make use of broadband, there is no single metric or set of metrics that can define an optimal "broadband service." And attempting to develop such metrics would only be an exercise in frustration. America's broadband plan should not attempt to draw artificial boundaries around broadband services based on erroneous assumptions regarding consumer preferences. The Commission should instead examine each market segment and develop a set of performance characteristics that reflect consumer demand in different product and geographic markets and market segments. If yesterday's issue with the definition of broadband was a failure to update throughput metrics to reflect the then-current marketplace, today's issue is a failure to update the *entire approach* to reflect the actual variety of broadband uses and needs.

B. Broadband definitions that focus solely on "speed" do not accurately reflect consumer preferences.

The FCC's current definitions of broadband also implicitly assume that the primary differentiator of broadband services is "speed" (throughput).[44] This

[44] *Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans*, Report and Order and Further Notice of Proposed Rulemaking, FCC 08-89 (rel. Jun. 12, 2008) (available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-08-89A1.pdf).

misplaced priority has led many to further assume that "speed" is the primary definitional issue in American broadband policy and that the holy grail of broadband policy is a ubiquitous broadband network supporting certain upstream and downstream speeds. These assumptions are not supported by relevant data, which reveals that broadband "speeds" play a minor role in consumer decisions regarding broadband. Consumers do not purchase "speed"; they purchase broadband solutions that meet their needs, which vary considerably based on the relevant product and geographic markets. Depending on the market, characteristics such as mobility, cost, reliability, coverage, energy consumption, or security can be far more important than the throughput of a particular broadband network or service.

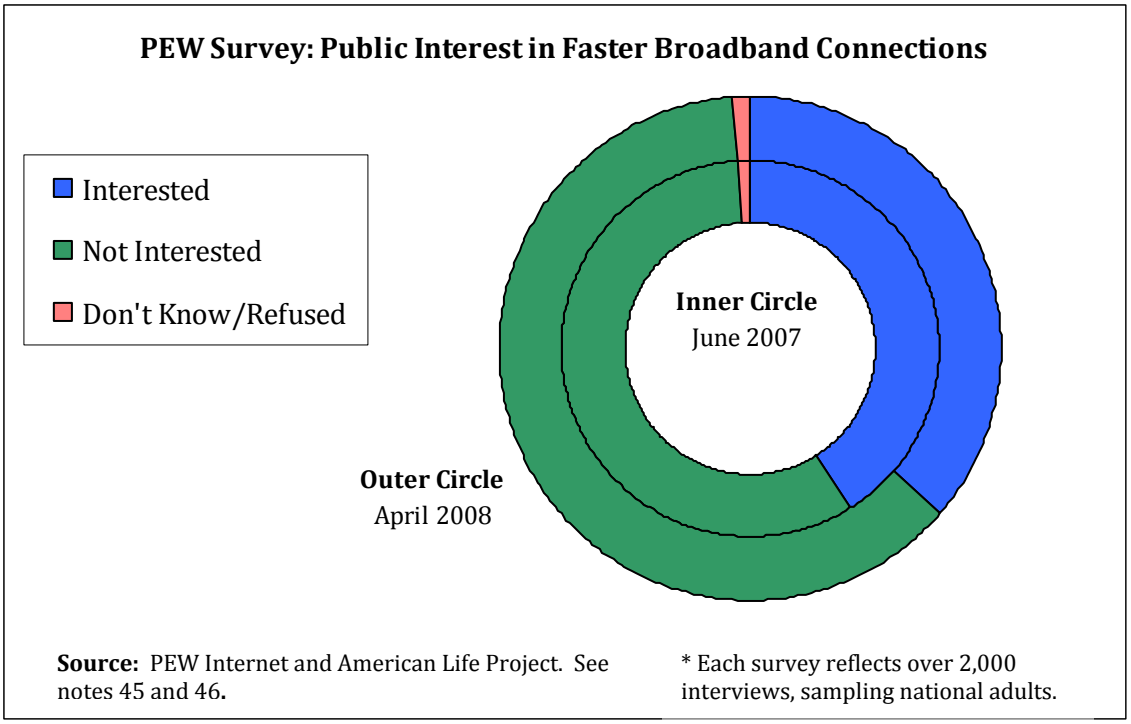
With increased interest in mobility and the ever wider availability of faster broadband connections, consumers are increasingly less focused on the "speed" of broadband connections as their defining feature. In response to a June 2007 poll conducted by PEW Internet & American Life Project, 41% of consumers said they would like to have a faster broadband connection, and 58% said they were not interested in a faster connection.[45] Less than a year later, in April 2008, only 36% of consumers were interested in faster broadband connection, and 62% were uninterested.[46]

---

[45] Lee Rainie, *Information Searches That Solve Problems: Survey Questions.* Pew Internet and American Life Project, at 6 (Dec. 30, 2007) (available at http://www.pewinternet.org/~/media//Files/Questionnaire/Old/Topline_Pew_UI_Libraries.pdf).

[46] John B. Horrigan, *Home Broadband 2008: Survey Questions.* Pew Internet and American Life Project, at 20 (Jul. 2, 2008) (available at http://www.pewinternet.org/~/media//Files/Questionnaire/Old/PIP_Broadband.2008.Topline.pdf).

Figure 3



This trend will likely increase as next generation 4G technologies are deployed, which are capable of throughput supporting "the vast majority of uses critical to economic and social participation in cyberspace."[47] In economic terms, "speed" is subject to the law of diminishing returns.

C. To the extent America's broadband plan includes "speeds" in broadband definitions, "speeds" must reflect the needs and capabilities in each market segment.

As future technological innovation makes higher throughput possible, competitive forces will operate to ensure that consumers receive the throughput they demand. Nevertheless, to the extent throughput criteria is included in definitions of broadband, the Commission should at the least take account of different throughput requirements of different services and products as well as

[47] Comments of the Consumer Federation of American and Consumers Union, Report on Rural Broadband Strategy, GN Docket No. 09-29 (FCC), at 4 (filed Mar. 25, 2009).

different throughput limitations in different broadband technologies. Otherwise, a definition could favor one technology over another (or one set of applications over another) for arbitrary reasons that are unrelated to consumer preferences and would deter, and not advance, broadband deployment. In particular, if the Commission defines broadband "speeds," it should establish separate speeds for mobile wireless broadband networks. An inherent feature of wireless technology is that speed must be balanced against mobility and the cumulative demands placed on the network by the community of users. Thus, when establishing throughput definitions for mobile wireless broadband, the FCC should consider mobile throughput without reference to throughput offered in other product markets by other technologies.

The potential to deter otherwise beneficial broadband deployment through arbitrary threshold definitions of broadband "speed" is nowhere more apparent than in calls to require symmetrical uplinks and downlinks. Requiring symmetrical "speeds" for all product markets would disserve consumers and would not be technology neutral. Whatever the optimal solution is for wired networks, the FCC should not require symmetrical threshold "speeds" for mobile wireless broadband networks. Mobile uplink "speeds" are limited by the relatively low power of mobile devices – a necessary safety precaution dictated by physics and biology. Requiring symmetrical "speeds" through regulation may thus have the effect of *lowering* downlink "speeds" in mobile wireless broadband networks rather than raising uplink "speeds."

IV. COMPETITION

A. Market forces are driving substantial deployment of mobile broadband networks.

The most recent FCC report on wireless competition shows that even in the absence of a strong national policy promoting broadband deployment, the competitive market is resulting in very substantial deployment of mobile narrowband and broadband wireless networks. Indeed, the U.S. is leading the world in mobile broadband and wireless competition, and American consumers have a strong preference for *mobile* broadband access.

Specifically, the Commission found that:

- The U.S. is the most competitive wireless market in the world and that "wireless technology is increasingly being used to provide a range of mobile broadband services."[48]
- "U.S. consumers continue to reap significant benefits -- including low prices, new technologies, improved service quality, and choice among providers" from wireless competition.[49]
- "Mobile Internet penetration is higher in the United States (15.6 percent of wireless subscribers) than in Western European countries." The U.S. also passed Japan in 2007 in mobile penetration.[50]
- Competition is driving technological advances. Approximately 95% of Americans enjoy at least three wireless competitors and 60% enjoy at least

[48] 13th CMRS Competition Report, *supra* note 16, at p. 5.

[49] *Id*.

[50] *Id*. at p. 10.

five competitors, while "no single competitor has a dominant share of the market."[51]

- Competition is also bringing lower prices. U.S. wireless prices were 6 cents per minute as compared to 20 cents in Europe, and 26 cents in Japan.[52]
- The result of much lower wireless prices in U.S. means "U.S. mobile subscribers lead the world in average voice usage by a wide margin . . . ."[53]
- In 2008, approximately 18% of U.S. households had "cut the cord."[54]

These data have critical policy implications. Even without strong policy direction from the government, competitive market forces are responding to consumer demand, resulting in very substantial investment in wireless broadband networks.

As we discuss in what follows, there is much the government can do to advance this digital revolution; in particular, the data also shows that there is a growing digital divide that government should address, as the benefits of broadband mobility are not being shared by all Americans. But in an environment in which private investment is creating such strong broadband growth, the first principle of any regulatory policy should be to do no harm to what the market is already producing. The substantial stimulus funds directed at broadband deployment, and any conceivable broadband subsidy resulting from universal service policies, are dwarfed by the size of the private investment in the mobile broadband marketplace.

---

[51] 13th CMRS Competition Report, *supra* note 16, at p. 6.

[52] *Id*. at p. 10.

[53] *Id*. at p. 10.

[54] *Id*. at para. 230.

Where the environment is one of market success and not market failure, regulatory policy should be to secure and advance that market success. The government should not try to fix what is not broken.

Instead, national broadband policy should be guided by twin goals: *first,* promote and advance the competitive market forces that already are driving broadband deployment by minimizing barriers to deployment and promoting investment; and *second,* re-direct federal universal service programs to promote broadband deployment and use in locations and among populations where the market is not already addressing this consumer demand. In the remainder of this Section IV we address policy initiatives that would enhance the competitive marketplace. Then, in Section V we address broadband universal service and the digital divide, and in Section VI we describe options for promoting competition in the backhaul and middle mile markets.

B. America should promote policies that minimize barriers to the deployment of wireless broadband infrastructure and encourage additional investment.

The deployment of wireless broadband infrastructure is often challenging. Local zoning restrictions, state and local taxes, federal regulations, radiofrequency coordination, financing, backhaul and other issues can all present barriers to infrastructure deployment and discourage additional investment. Although many of these barriers are the result of important policy considerations, their impact on the national strategic imperative of universal broadband access has too often been an afterthought. America must find the right balance between rapid wireless

broadband deployment and other policy considerations, and should minimize unnecessary barriers to deployment.

a. Eliminate obstacles to tower siting, pole attachments, and rights-of-way.

The Commission's plan for deploying broadband to rural areas should ensure that state and local zoning processes, and game-playing by utilities, are not a barrier to competitive deployment. The ability to deploy wireless systems and expand wireless service in rural areas (and throughout the country) depends on the availability of sites for the construction and placement of towers and transmitters, pole attachments, and access to rights-of-way. Federal policy should ensure that these prerequisites to facility construction do not become or remain barriers to competitive deployment.

Specifically, the local zoning approval process in many areas of the country has mired wireless build-out in unnecessary and counterproductive delay. To mitigate this problem, the Commission as a part of its national broadband plan should grant a pending Petition for Declaratory Ruling requesting establishment of a tower "shot clock" filed by CTIA – The Wireless Association ("CTIA"),[55] which recognizes the balance established by Congress between state and local zoning authority and federal deployment imperatives. In July 2008, CTIA asked that the Commission clarify "[l]ingering ambiguities in several key statutory provisions that have been exploited by a subset of zoning authorities, substantially impeding

[55] See Public Notice, DA 08-1913, WT Docket No. 08-165 (rel. Aug. 14, 2008).

wireless buildout."[56] The Petition requests that the Commission resolve questions regarding the timeframes in which zoning authorities must act on wireless facilities-siting requests,[57] and establish a "shot clock" requirement to ensure the timely build-out of critical mobile broadband facilities.[58]

In implementing rules facilitating tower citing, the Commission must also ensure regulatory parity for *all* wireless broadband providers. For instance, many wireless broadband Internet access providers who do not provide traditional commercial mobile radio service (CMRS) suffer from the same unnecessary facilities-siting delays as CMRS providers as well as something worse: state and local zoning authorities often do not afford mobile wireless broadband providers the protections to which they are entitled pursuant to Section 332(c) of the Act.[59] The Commission therefore should make explicit that the "functionally equivalent services" language in section 332(c)(7)(B)(I) applies to every wireless broadband service provider, not just those who are traditional CMRS providers.[60]

The Commission should also reevaluate its authority to extend the protections of Section 224 governing pole attachments to wireless broadband providers.[61] As with antenna siting, wireless broadband network deployment

---

[56] *See* Petition to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review and to Preempt Under Section 253 State and Local Ordinances that Classify All Wireless Siting Proposals as Requiring a Variance, WT Docket No. 08-165, Petition for Declaratory Ruling (filed Jul. 11, 2008).

[57] *See id*. at ii.

[58] *See id*.

[59] *See* 47 U.S.C. § 332(c).

[60] 47 U.S.C. § 332(c)(7)(B)(I).

[61] *See* 47 U.S.C § 224.

depends on the timely negotiation of rights to attach to the utility poles of power and telephone companies at regulated rates. In its order declaring that wireless broadband is an information service, the Commission clarified that where a wireless service provider uses the same pole attachments to provide both telecommunications and wireless broadband Internet access services, section 224 applies.[62] The Commission also stated that, "[a]lthough we do not reach the question of the applicability of section 224 when an entity is solely providing wireless broadband Internet access services, we note that that issue may be addressed in other pending Commission proceedings."[63]

The Commission should address this issue now. Section 224 of the Act's pole attachment rules poses a twofold challenge for providers of wireless broadband Internet access services. Utilities not only delay negotiations of Section 224 pole attachment agreements for all providers, but often hesitate to negotiate such agreements at all with providers of nascent or "non-traditional" wireless broadband Internet access services due to the uncertain regulatory status of these providers pursuant to the language of Section 224.[64] This regulatory uncertainty harms both consumers and competition because wireless broadband Internet access providers deploy valuable services to consumers. To address this disadvantage, the Commission should adopt its tentative conclusion that "*all categories* of providers

---

[62] *Appropriate Regulatory Treatment for Broadband Access to the Internet Over Wireless Networks*, 22 FCC Rcd 5901, WT Docket No. 07-53, at para. 60 (2007).

[63] *Id*. at para. 62.

[64] Section 224 of the Act states that "[t]he term 'pole attachment' means any attachment by a cable television system or *provider of telecommunications service* [emphasis added] to a pole, duct, conduit, or right-of-way owned or controlled by a utility." 47 U.S.C § 224(a)(4).

should pay the same pole attachment rate . . . . [T]he critical need to create even-handed treatment and incentives for broadband deployment would warrant the adoption of a uniform rate for all pole attachments used for broadband Internet access service."[65]

Fair and non-discriminatory tower citing and pole attachment rules are critical to broadband deployment, especially in rural areas. In order to achieve ubiquitous mobile broadband coverage, approximately 16,000 new towers will need to be constructed and 55,000 existing towers will need to be augmented. New facilities are especially critical in light of the aggressive build-out requirements associated with recently auctioned 700 MHz spectrum, which are the most stringent ever adopted by the Commission.[66] Additional wireless facilities would also advance the public safety goals of E911 and public safety communications by enhancing coverage and capacity.

To address these serious concerns, the Commission should establish common-sense safeguards to ensure state and local zoning processes do not undermine federal broadband goals.

These safeguards include:

- Clarifying the time periods in which a state or locality must act on wireless facility siting requests before a "failure to act" will be found under Section 332(c)(7)(B) (45 days for collocations; 75 days for all other facilities).

[65] *Pole Attachments NPRM*, 22 FCC Rcd 20195, at para. 36 (2007) (emphasis added).

[66] See *Service Rules for the 698-746, 747-762, and 777-792 MHz Bands*, Second Report and Order, FCC 07-132, at paras. 140-77 (rel. Aug. 10, 2007).

- Finding that, in the event that a failure-to-act benchmark is triggered, the application should be deemed granted. In the alternative, establish a presumption that, once judicial review is triggered by a failure to act, a wireless carrier is entitled to an injunction ordering the state or local zoning authority to grant the siting application unless the authority can justify the delay.
- Clarifying that the statute bars zoning decisions that have the effect of prohibiting an additional entrant from offering service in a given area.
- Issuing a declaration that zoning ordinances requiring variances for all wireless siting requests will be struck down if challenged in the context of a Section 253 petition.
- Clarifying that all categories of providers are entitled to pay the same pole attachment rate.

The Commission can address these issues without intruding on privileges reserved to the states. It was *Congress* that expressly identified the important national interest in the tower siting process by limiting traditional local authority when it promulgated section 332(c)(7). As the Supreme Court has noted, section 332(c)(7) was designed to reduce "the impediments imposed by local governments upon the installation of facilities for wireless communications, such as antenna towers,"[67] and hence "imposes specific limitations on the traditional authority of

[67] *City of Rancho Palos Verdes v. Abrams*, 544 U.S. 113, 115 (2005).

state and local authorities to regulate the location, construction, and modification" of the facilities necessary for wireless communications.[68]

Finally, and in the same way, state law and municipal rules restricting or delaying access to public rights-of-way frequently needlessly delay or deter facilities build-out. Recent federal rules have acknowledged this problem and attempted to address it in some respects, and the Commission should remain vigilant to exercise federal authority to eliminate these additional barriers to entry.

b. Assure availability of adequate spectrum resources to meet growing demand for wireless broadband services.

To support the most advanced wireless broadband services, wireless broadband networks require wider contiguous bandwidths than traditional cellular networks. A traditional handheld device, with average customer usage patterns, will consume about 30 megabytes of data in a month.[69] A single smart phone is consuming 30 times that amount, and a single connected notebook or laptop computer is consuming 450 times that amount.[70]

---

[68] 544 U.S. at 115 (2005).

[69] *See Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update*, White Paper, at 3 (Jan. 29, 2009) (available at http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html).

[70] *See id*.

Figure 4

Average Megabytes Consumed per Month

Device	MB/Month
Regular Phone	30
Smart Phone	900
Laptop	13,500

Source: Cisco Virtual Networking Index. See note 69.

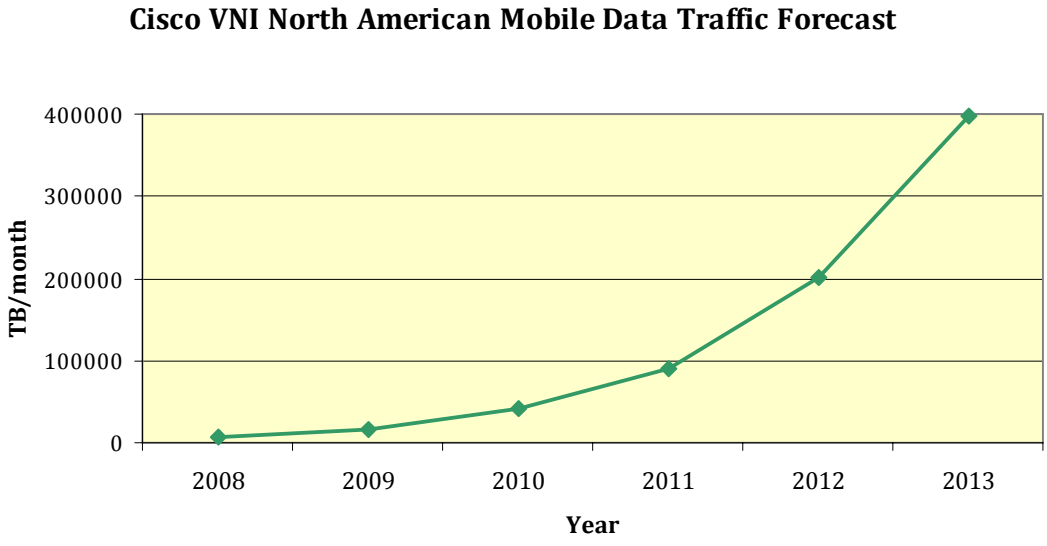
Given that smart phones constituted only 23% of all U.S. handset sales at the end of 2008, but are rapidly increasing in market share, the trend toward higher bandwidth usage is continuing to accelerate.[71]

The continuing emergence of wireless applications that more fully integrate broadband into our daily lives will generate even more demand for contiguous wireless broadband spectrum than we have today. Cisco estimates that mobile data traffic in North America will increase 129 percent from 2008 to 2013.[72]

[71] *See The NPD Group: Despite Recession, U.S. Smartphone Market is Growing*, Press Release (rel. Mar. 3, 2009) (available at http://www.npd.com/press/releases/press_090303.html).

[72] *Cisco Visual Networking Index*, *supra* note 69, at 6 (Appendix A, Table 1).

Figure 5



Source: Cisco Virtual Networking Index. See note 72.

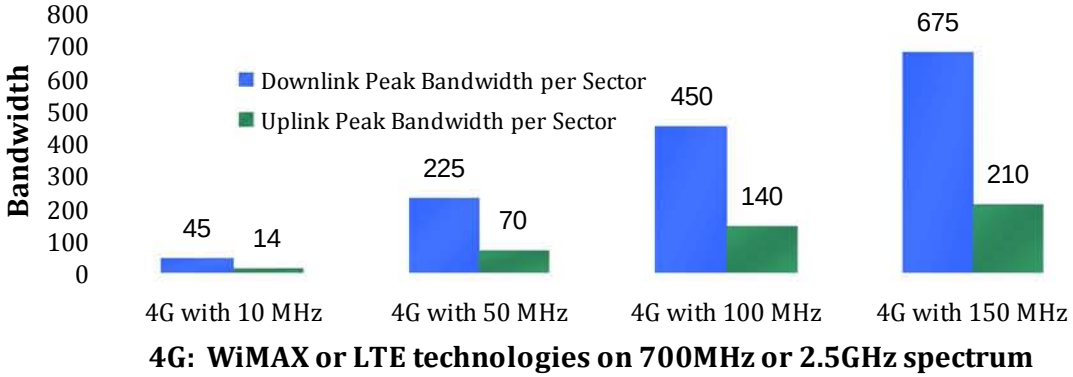
As traffic increases, so does spectrum use.

Although no one can accurately predict how much additional spectrum will be required to support robust competition in a fully interconnected world, more spectrum will likely be needed to meet increasing capacity requirements. The chart below provides a sense of the scope of this problem by demonstrating the fundamental relationship between spectrum and capacity.[73]

[73] This analysis assumes downlink rates of 4.5 bits per hertz downlink and 1.4 bits per hertz uplink and the use of advanced technologies to mitigate self interference among sectors (i.e., a reuse of one). Real-world conditions would likely produce lower average throughput; however, this is an example of the type of analysis necessary to better understand the relationship between spectrum needs and increases in demand.

Figure 6

Total Bandwidth Available per Single Sector Site



4G: WiMAX or LTE technologies on 700MHz or 2.5GHz spectrum

Source: See note 73.

Using next-generation, 4G technologies with 150 MHz of spectrum, a mobile wireless broadband provider can *theoretically* deliver 675 Mbps of capacity per single sector site, which means that such a site could theoretically support 67 consumers simultaneously using 10 Mbps of downlink capacity each. These theoretical throughput rates go down drastically as the amount of available spectrum drops. A single sector site with 100 MHz can support only 45 consumers simultaneously using 10 Mbps of downlink capacity each; 50 MHz can support only 22 such consumers; and 10 MHz can support *only 4* such consumers. These limits apply regardless of the frequency band the site uses.

The above rates are only theoretical; Figure 6 represents a "best-case scenario." In real-world conditions, throughput would typically be less depending on a number of factors, including the level of frequency reuse, topography, and the location and speed of movement of the user. In rural areas with low population

density (less than 100 persons per square mile),[74] the potential for network overload is less acute. In densely populated areas, however, the situation is more problematic. In urban areas like Manhattan, which has a population density of 69,873 persons per square mile,[75] spectrum constraints present a significant challenge for mobile wireless broadband.

If current trends continue, it is likely that mobile wireless broadband providers will require 150 MHz of spectrum or more to adequately meet consumer needs. To address this issue, the national broadband plan should contain a commitment to assure adequate spectrum to meet consumer demand for mobile broadband services. Such a commitment will help assure that private investment will continue to meet this growing demand.

Finally, WCAI agrees with the Commission that a mix of licensed and unlicensed spectrum will best accommodate a variety of services in a technologically neutral manner,[76] and we look forward to developing a record in this proceeding on the appropriate mix.

V. UNIVERSAL WIRELESS BROADBAND SERVICE

In the American Recovery and Reinvestment Act of 2009, Congress made achieving universal broadband access at affordable prices a national priority. Meeting this goal requires a fundamental shift in priority – from universal service policies supporting yesterday's plain old telephone service (POTS) to universal

---

[74] See 13th CMRS Competition Report, *supra* note 16, at Map B-33.

[75] See http://www.demographia.com/dm-nyc.htm.

[76] See generally, *Unlicensed Operation in the TV Broadcast Bands*, Second Report and Order and Memorandum Opinion and Order, FCC 08-260 (rel. Nov. 14, 2008).

service policies supporting today's broadband technologies. Policy makers must be prepared to eliminate the vestiges of outdated universal service policies that in their time brought affordable phone service to virtually every household in the country, but now largely have outlived their purpose and have instead become impediments to universal broadband deployment and the closing of the digital divide. Development of a forward-looking national broadband plan thus requires the Commission to reform its universal service program to respond to the demands of the broadband future.

The nation's original universal service program was based on the understanding that the then-innovative voice telephony service would be more valuable to everyone if everyone had a phone, and on the concomitant understanding that voice telephony was a powerful economic and cultural tool, and that households would be unfairly left behind if they could not afford a phone.

What was true a century ago about voice telephony is equally true today about broadband. Broadband is a transforming technology that is essential to facilitating innovation and improving our quality of life. With next generation broadband networks, our ability to communicate is limited only by the human imagination. Video, voice, photographs, animation, graphics, text, documents, and other data of all kinds can be transmitted in real-time by anyone to anyone on the network. The resulting collaboration is sparking a revolution in productivity and enabling the innovation that is essential to our future prosperity – which will be even more valuable when everyone has broadband access.

The most important thing the government can do to stimulate broadband demand and the market forces it generates is to shape a competitive environment that makes broadband available and affordable to every household in the country. And while more and more households currently are enjoying the benefits of broadband, there is troubling evidence that too many poor and rural households are being left on the wrong side of a growing digital divide. Adoption rates among lower income Americans have begun to flatten.[77] Without access to broadband networks, these Americans cannot fully participate in the ongoing digital revolution.

For America to remain competitive in a global economy, it must connect everyone to broadband networks at affordable prices, no matter who they are or where the live. To accomplish this goal, the Commission should comprehensively reform all of its universal service policies with a broadband paradigm as its lodestar.

New universal broadband service policies should be based on the following principles:

- To make broadband universal service possible, outdated existing universal service mechanisms may need to be eliminated completely or adapted to the new paradigm.
- Rural and low income consumers should have access to broadband services that are reasonably comparable to those broadband services provided in urban areas at reasonably comparable rates.

---

[77] *See* John B. Horrigan, *Home Broadband Adoption 2008: Adoptions stalls for low-income Americans even as many broadband users opt for premium services that give them more speed*, Pew Internet and American Life Project (Jul. 2, 2008) (available at http://www.pewinternet.org/Reports/2008/Home-Broadband-2008.aspx).

- Because mobile and fixed broadband services operate in distinct markets, for low income and rural consumers to have reasonably comparable broadband access, universal service policies must support both fixed (whether wired or wireless) and mobile broadband access in every area where feasible.
- Low income consumers should receive support for the purchase and installation of broadband equipment and broadband service.
- Funding for universal broadband service policies should be project-based.
- The shift from POTS to universal broadband service policies will require a transition period.

A. Current universal service policies are obsolete and unsustainable.

Universal service has been one of this country's great regulatory success stories. It has brought telephony to virtually every household in the country and has been a powerful engine for a century of economic growth. But virtually every aspect of the current system is in need of drastic overhaul. The funding mechanisms are no longer adequate or equitable, the subsidies are no longer tailored to their ostensible purposes, and the recent stop-gap changes to the system simply serve to underscore the program's growing obsolescence.

To begin, the current program is based on regulatory classifications made irrelevant by the digital revolution. The distinction between "long distance" and "basic local exchange" service no longer bears any relation to technological or business reality, and the many regulatory, jurisdictional and subsidy decisions that turn on these classifications now result in wasted resources, unproductive arbitrage, and multiple and significant barriers to increased broadband access.

Much the same can be said for outdated carrier of last resort requirements, irrational intercarrier compensation mechanisms, and state and federal explicit subsidy mechanisms focused on the offering of a particular service (POTS telephony) in a particular way (flat-rated "local" plus usage-sensitive "access/long distance"). Because providers are incented to conform their business models to outdated regulatory classifications, they are discouraged from investing in the next generation broadband technologies that consumers actually want. Ironically, it is consumers who are supposed to benefit from the current outdated system of subsidy that are most hurt by it, as they are deprived of the benefits of broadband deployment that is taking place in urban and suburban environments.

The universal service treatment of narrowband *mobile* services is emblematic of the incoherence of the current system. Any number of wireless CETCs can receive universal service funding for providing the same services to the same customers. That funding is based on the cost of providing wireline services, even though the costs of providing wireless and wireline service are completely different. In the mean time, wireline service is subsidized as if competitive wireless service did not exist, even though for many customers narrowband wireless and wireline services are substitutes. And when these multiple problems led to an unsustainable growth in demand for universal service subsidy, the Commission responded by freezing wireless subsidy at current levels, leaving all of the irrationalities in the current system in place and assuring that there is no funding available for the types of mobile broadband services that are being deployed in urban and suburban neighborhoods.

In sum, the unintended consequence of continuing current universal service policies is to *deepen the digital divide* rather than bridge it. Given this reality, there is no longer any policy rationale to support such a system, and every reason to reinvent it. As Congress rightly recognized, it is time for *fundamental* reform.

B. Low income and rural consumers should have broadband access that is reasonably comparable to broadband access available to high income and urban consumers, including both fixed and mobile broadband services.

As universal service policies transition to focus on broadband services, the legal standard and the policy objective for rural and low income consumers remains the same: rural and low income consumers should have access to broadband services that are reasonably comparable to those broadband services provided in urban areas at reasonably comparable rates. Since the goal is to make broadband access universal, the regime should ensure that broadband service is as affordable for rural households and for the poor as it is for urban households and the more fortunate.

For low income and rural consumers to have reasonably comparable broadband access, universal service policies must support both fixed (whether wired or wireless) and mobile broadband access in every area where feasible.[78] Here there is an important difference between the narrowband voice and the broadband markets. In the narrowband voice market, wireless telephony offers virtually all of the services offered by fixed wireline service, and in addition offers

[78] Because broadband can provide all of the benefits of POTS and so much more, POTS should no longer be supported at all. Indeed, legacy universal service policies have been a substantial factor in the slow development of broadband in rural areas. *See* NOI, *supra* note 1, at para. 39.

mobility. That is why more and more consumers are "cutting the cord" and relying exclusively on wireless telephony for voice service.

Fixed and mobile wireless networks do not provide identical functionality. Fixed networks are capable of providing highly-reliable service to home networks supporting a plethora of devices simultaneously, including high-definition video. Currently, broadband wireless devices cannot offer the bandwidth to provide comparable services. On the other hand, as the only broadband platform that is capable of providing access everywhere, all the time, wireless broadband platforms offer *mobility*. Recent Pew research thus reveals that "mobile and wireline access tools have a symbiotic relationship."[79]

Although the cost and mobility advantages of mobile wireless broadband make it the ideal candidate for initial deployment in unserved and underserved areas, in the longer term, both mobile wireless and wired broadband should be deployed in *every* area, because they are different products that meet different needs. In areas where both fixed and mobile wireless broadband are available, consumers commonly subscribe to both services, which shows that they are complementary products rather than substitutes.[80] Indeed, in the *Sprint-Clearwire Order*,[81] the FCC found that there were separate product markets for (1) mobile telephony/broadband services and (2) fixed broadband services. Specifically, the FCC determined that the combined product market for mobile

[79] Horrigan, *The Mobile Difference*, *supra* note 12, at 4.

[80] See Comments of the Consumer Federation of American and Consumers Union, Report on Rural Broadband Strategy, GN Docket No. 09-29 (FCC) at 5-6 (filed March 25, 2009).

[81] *Sprint Nextel Corp. and Clearwire Corp.*, Memorandum Opinion and Order, FCC 08-259, at para. 26 (rel. Nov. 7, 2008).

telephony/broadband services includes mobile telephony services and emerging, next-generation mobile wireless broadband services.[82] Conversely, the FCC defined the fixed broadband services market consistent with previous definitions applied in the fixed service context, which exclude mobility.[83]

Without similar access to mobile and fixed platforms, rural and low income consumers will not be able to take advantage of broadband services reasonably comparable to those available to others. As noted above in Section II, the entire computing paradigm is shifting to a ubiquitous computing environment that relies on wireless broadband connectivity. And consumers already prefer mobility to fixed access. Against this backdrop, a market cannot be viewed as receiving reasonably comparable broadband services when consumers have access to fixed broadband service but lack access to mobile wireless broadband service. Otherwise, these consumers would be forced to forgo the full benefits and capabilities of broadband access enjoyed by consumers in markets with access to *all* broadband product markets – including mobile wireless broadband.

If all Americans are to have access to broadband comparable to that available in urban markets, then all Americans must have access to both fixed and mobile broadband services. Accordingly, for purposes of setting universal service subsidy, the Commission should define areas in which mobile wireless broadband is unavailable as lacking reasonably comparable access. Anything less would leave American consumers and small businesses in such areas at a continuing

[82] *Id*. at para. 38.

[83] *Id*. at para. 46.

disadvantage to their urban counterparts – the severity of which will only increase as computing and communications moves into its next phase.

C. Universal service reform must include financial assistance for low income consumers.

A successful universal service program must address the supply side as well as the demand side. To achieve universal broadband adoption requires more than building broadband networks; it requires financial assistance for low income consumers. There is a mounting body of evidence that the poor frequently do not take advantage of broadband service even when it is available to them.[84] To ensure these consumers can take advantage of broadband access, and to close the digital divide, households that cannot afford broadband service should received support for the purchase and installation of broadband equipment and broadband service. Eligibility for this program should be similar to that currently used for legacy Lifeline/Linkup programs. These funds could be used to subsidize a percentage of the cost of fixed broadband access installation (including satellite, where applicable) and the cost of devices (including mobile wireless broadband access devices). This program could also provide low income consumers with a monthly subsidy to offset the cost of fixed or mobile wireless broadband access.

D. Mobile broadband platforms should be supported by a separate program.

Because both the costs and the markets for fixed and mobile broadband platforms are different, fixed and mobile broadband platforms should be supported

[84] *See* Horrigan, *Home Broadband Adoption 2008*, *supra* note 71.

by different universal service programs. The fixed program should be used to provide incentives for fixed broadband deployment (as defined above) in areas where fixed broadband service is not already available. The mobile broadband program should be used to encourage mobile wireless broadband deployment (as defined above) in areas where mobile broadband service is not already available. The level of subsidy associated with each program should reflect the additional capital required in the market to make feasible the respective deployment of infrastructure for fixed or mobile broadband services. Both programs should be designed to provide project-based funding to construct new broadband networks in unserved areas. The goal would be to provide both fixed and mobile broadband services to every American at affordable prices.

On the other hand, putting these two distinct services in one universal service program would re-create many of the problems identified in the current narrowband program – it would make it more difficult for the Commission to take account of the cost differences between the two services, and would create the risk of both subsidizing too few services (fixed but not mobile, for example), and too many (multiple providers of the same service).

E. The shift from universal service policies supporting mobile voice to policies supporting broadband will require a transition period.

The universal broadband service policies envisioned here require a fundamental rethinking of existing universal service policies. Many existing universal service mechanisms that were specifically tailored to the POTS paradigm may not translate to the broadband environment. The long relationship between implicit and explicit universal funding and the associated relationship between

universal service and intercarrier compensation regimes should not be carried over into a new system of broadband subsidy. Neither should such stop-gap measures as the current cap on CETC funding. Policy makers instead will need to adapt whatever policies sensibly should be continued to the new broadband paradigm and jettison everything else.

Because the changes required are substantial, the shift from POTS to broadband will require an appropriate transition period. All explicit and implicit support for POTS services will need to be phased out over time, and funding will need to be found for the new broadband programs.

VI. BACKHAUL AND MIDDLE MILE

A. Next-generation 4G mobile wireless broadband will require all-new backhaul networks.

Backhaul and middle mile transport services are necessary for all mobile wireless broadband networks. Today's cellular networks typically rely on T1 lines to backhaul traffic from base station sites. The transition to next generation mobile wireless broadband technologies with bandwidth capabilities per base station in the range of 100 to 300 Mbps is rapidly rendering these T1 lines obsolete.[85] Without adequate backhaul and middle mile capacity, the throughput otherwise available on 4G networks will not be realized. Because existing backhaul networks are unable to

[85] See Dr. Alan Solheim, *Choosing the Backhaul for LTE*, 4G Wireless Evolution (Mar. 13, 2009) (available at http://4g-wirelessevolution.tmcnet.com/topics/4g-wirelessevolution/articles/52237-choosing-backhaul-lte.htm).

adequately support next-generation 4G mobile wireless broadband technologies, new backhaul networks must be built.[86]

B. America should make a limited number of TV white spaces channels available for fixed wireless backhaul.

The high cost and difficulty of constructing and deploying new backhaul and middle mile facilities is rapidly becoming a barrier to the widespread availability of affordable broadband services. The lack of readily available backhaul and middle mile services is particularly problematic in rural areas where great distances often exist between a local network and an access point. America's broadband plan must consider new strategies to promote investment in and construction of affordable backhaul and middle mile capacity for 4G wireless broadband networks in both rural and urban areas. Making a limited number of TV white spaces channels available for fixed wireless backhaul would both promote competition among backhaul service providers and increase the availability of affordable backhaul solutions.

One viewpoint is that fiber backhaul should be deployed everywhere. Where it can be economically installed, fiber is an excellent choice for backhaul. However, due to fiber's relatively high cost and lengthy installation, fixed wireless is often a more attractive alternative. Fiber installation costs range from $10 to $40 per foot for rural and suburban areas and range from $50 to $200 per foot in dense urban areas.[87] In a typical American metro deployment, the average connection length

[86] Solheim, *Choosing the Backhaul for LTE*, *supra* note 86.

[87] *Id*.

ranges from 10,000 and 20,000 feet.[88] Even taking the low end of the scales for cost and length, fiber build out cost per site in such areas is on the order of $300,000 before any electronics are placed at the end of the fiber to provide capacity.[89] A microwave link, including hardware, installation, and an allocation for operations cost over the life of the link would be on the order of *10 times lower* cost.[90]

The Achilles heel for microwave links in rural areas is range and antenna size, which is largely a function of the spectrum bands that are currently available for fixed links. A single fixed wireless link using a 3-foot or smaller antenna in the 11 GHz band typically may cover distances from less than a mile up to 7 miles. In the 6 GHz band a carrier-grade link may be established at up to 20 miles with a single radio pair, though that requires 6-foot or taller dishes which in turn require very sturdy towers. Covering distances of 50 to 100 miles requires multiple microwave links and towers, which is a significant obstacle in most cases.

This limitation could be overcome, however, by using the DTV white spaces. A 100-mile fixed wireless backhaul connection using the white spaces would typically cost less than $200,000 to construct. The same connection using 6 GHz spectrum would likely cost more than $3 million, more than *15 times* as much. At this distance, a new fiber build would be at least 20 to 30 times more expensive and would take much longer to build than a fixed wireless link, which can often be installed in a matter of days.

---

[88] Solheim, *Choosing the Backhaul for LTE*, *supra* note 86.

[89] *Id*.

[90] *Id*.

Ample white spaces spectrum exists in rural areas to accommodate wireless backhaul. Typically, rural areas possess anywhere from 15 to 48 vacant TV white space channels, and current equipment could be easily adapted for use in this spectrum. If a fixed, licensed regime were authorized in a portion of the DTV white spaces, one of the primary obstacles to rural broadband deployment – backhaul and middle mile transport – would be largely overcome. America's broadband plan should designate some DTV white spaces channels in rural areas (where vacant second-adjacent channels exist) for fixed, licensed operations.

VII. CONCLUSION

WCAI looks forward to working with the Commission to develop a national broadband policy that ensures every citizen access to mobile broadband connectivity at affordable rates.

Respectfully submitted,

Wireless Communications Association
International, Inc.

By: /s/ Susan Polyakova

Susan Polyakova
Vice President, Communications & Strategy
1333 H Street, NW, Suite 700 West
Washington, DC 20005
202.452.7823

June 8, 2009